E-mail/Speed post

B-190188/Tannery/WQM-II/CPCB/2021-22/ **Dated: August 18, 2022**
23

To,

Chairman,
Uttar Pradesh Pollution Control Board,
Building No. TC-12V, Vibhuti Khand,
Gomti Nagar, Lucknow - 226 010

DIRECTIONS UNDER SECTION 18 (1) (b) OF THE WATER (PREVENTION AND CONTROL OF POLLUTION) ACT, 1974 REGARDING IMPLEMENTATION OF POLLUTION CONTROL MEASURES INCLUDING CLEANER TECHNOLOGY IN TANNERIES LOCATED AT KANPUR AND UNNAO.

WHEREAS, the Central Pollution Control Board, has delegated powers vested under Section 18 (1) (b) of the Water (Prevention & Control of Pollution) Act, 1974 to the Chairman, Central Pollution Control Board vide its resolution made in 133rd Board meeting item no. 3.12 dated 24th March, 2005 to issue directions under Section 18 (1) (b) of the Water (Prevention & Control of Pollution) Act, 1974 to the State Pollution Control Board(s); and

WHEREAS, amongst others, under section 16 of the Water (Prevention and Control of Pollution) Act, 1974, one of the functions of the Central Pollution Control Board (CPCB), constituted under the Water (Prevention and Control of Pollution) Act, 1974 is to coordinate activities of the State Pollution Control Boards & Pollution Control Committees to provide technical assistance and guidance to SPCBs / PCCs and to promote cleanliness of streams and wells in different areas of the States; and

WHEREAS, amongst others, under section 17 of the Water (Prevention and Control of Pollution) Act, 1974, one of the functions of the State Pollution Control Board (SPCB), constituted under the Water (Prevention & Control of Pollution) Act, 1974 is to plan a comprehensive programme for prevention, control or abatement of pollution of streams and wells located in the State and to secure the execution thereof; and

WHEREAS, the Central Government has notified the standards for discharge of environmental pollutants from various categories of industries, Common Effluent Treatment Plants (CETP) under the Environment (Protection) Act, 1986 and the rules framed there under; and

WHEREAS, Tanneries have been categorized under the 17 categories of highly polluting industries, with high volume of fresh water consumption and waste water discharge and adverse impact on environment due to high pollution load in terms of BOD, COD, TDS/FDS, Chloride and Total Chromium in effluents; and

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WHEARAS, there are three major tannery clusters in Kanpur-Unnao region namely Jajmau at Kanpur, Leather Technology Park (LTP) Banthar and Site-II at Unnao in the state of Uttar Pradesh and approx. 450 tanneries are located in these clusters. Most of the tanneries located in these clusters are connected for the treatment of their pre-treated effluent with CETPs located at respective cluster of Jajmau Kanpur (36 MLD), LTP Banthar (4.5 MLD) and Site-II Unnao (2.15 MLD). Few tanneries are standalone and have their own effluent treatment plant (ETP); and

WHEREAS, CETP at Jajmau, Kanpur is based on UASB technology for treatment of 9 MLD tannery effluent after mixing with 27 MLD domestic sewage and thus having design capacity of 36 MLD. About 350 tanneries discharge their effluent into the CETP, Jajmau for treatment; and

WHEREAS, CETP, Jajmau was inspected by the teams of officials from CPCB on 12.03.2021, 17.06.2021, 30.06.2021, 06.09.2021, 25.11.2021 and 24.02.2022 for compliance verification and found CETP non-complying w.r.t. treated effluent discharge standards notified for CETP by MoEF&CC vide notification dated 01/01/2016 under E (P) Act, 1986 for **BOD, COD, TSS, FDS, Chloride, Sulphide, Oil & Grease and Total Chromium**. Pre-treated tannery effluent received at the CETP tannery inlet channel was also not meeting the CETP norms prescribed by UPPCB for **pH, TSS and Total Chromium**; and

WHEREAS, CPCB issued directions dated 23.07.2021 and 08.12.2021 to UPPCB under section 18 (1) (b) of the Water (Prevention and Control of Pollution) Act, 1974 to take appropriate action against the CETP, Jajmau and its member units and CCRP, Jajmau; and

WHEREAS, UPPCB vide letters dated 27.09.2021 & 09.02.2022 informed that all tannery units of Jajmau have been issued directions to adopt cleaner technology to minimize effluent quantity and use of chemicals while granting CTO to tannery units; and

WHEREAS, CETP at LTP Banthar, District- Unnao is based on Activated Sludge Technology followed by tertiary filtration for treatment of tannery effluent has designed capacity of 4.5 MLD. About 27 tanneries discharge their effluent into the CETP, Banthar for treatment; and

WHEREAS, CETP, Banthar was inspected by the teams of officials from CPCB on 15.03.2021, 15.06.2021, 07.09.2021, 30.12.2021, 10.03.2022 and 12.05.2022 for compliance verification and found CETP non-complying w.r.t. notified CETP treated effluent discharge standards for BOD, FDS and Chloride continuously while COD, TSS, and Sulphide, during different occasions of inspections. Pre-treated tannery effluent received at the CETP inlet channel was also not meeting the norms prescribed by UPPCB for TSS and Total Chromium; and

WHEREAS, CPCB issued Show Cause Notices dated 22.06.2021, 21.10.2021 and 10.01.2022 under section 5 of Environment (Protection) Act, 1986 to M/s Banthar Industrial Pollution Control Company (BIPCC) and levied environmental compensation (EC) of Rs. 9,30,000 /- on BIPCC for non-compliance of CETP effluent discharge norms; and

WHEREAS, BIPCC on 17.02.2022, deposited EC in compliance of CPCB directions dated 10.01.2022; and

WHEREAS, CETP at Site-II, UPSIDC Industrial Area, Unnao is based on Activated Sludge Technology for treatment of tannery effluent has designed capacity of 2.15 MLD. About 15 tanneries discharge their effluent into the CETP, Unnao for treatment; and

WHEREAS, CETP, Unnao was inspected by the teams of officials from CPCB on 15.03.2021, 15.06.2021, 07.09.2021, 16.12.2021, 02.03.2022 and 12.05.2022 for compliance verification and found non-complying w.r.t. CETP treated effluent discharge standards notified for FDS and chloride continuously while BOD, TSS, Sulphide, and Oil & Grease during different occasions of inspections. Pre-treated tannery effluent received at the CETP inlet was also not meeting the norms prescribed by UPPCB for TSS continuously and Total Chromium on 15.06.2021; and

WHEREAS, CPCB issued Show Cause Notice dated 14.02.2022 under section 5 of Environment (Protection) Act, 1986 to M/s Unnao Tanneries Pollution Control Company (UTPCC) to show cause as to why environmental compensation should not be levied on UTPCC for non-compliance of CETP effluent discharge norms; and

WHEREAS, member units of CETP are jointly and individually responsible for providing adequate pre-treatment of their effluent, proper operation and maintenance of CETP and for ensuring compliance with effluent discharge norms; and

WHEREAS, non-compliance of standards by CETP is collective non-compliance by CETP member industries, and therefore action has to be taken against CETP member industries; and

It is evident that despite lapse of considerable time, the state of non-compliance of standards prescribed for treated effluent of CETPs in terms of FDS and Chloride specified in MoEF&CC Gazette notification dated 01.01.2016 notified under Environment (Protection) Rules, 1986 by the all three CETPs has continued unabated and it has become necessary that in-plant measures and cleaner process technology options shall be implemented to attenuate the TDS load because by employing advanced treatment systems such as reverse osmosis, membrane technology, mechanical evaporation, electro-dialysis and ion exchange the solids can only be trans located but cannot be degraded.

WHEREAS, Hon'ble NGT vide its orders dated 03.08.2018 and 19.02.2019 in Original Application No. 593/2017 (W.P. (Civil) No. 375/2012), Paryavaran Suraksha Samiti & Anr. Vs. Union of India & Ors. directed that "*The CPCB may take penal action for failure, if any, against those accountable for setting up and maintaining STPs, CETPs and ETP. CPCB may also assess and recover compensation for damage to the environment and said fund may be kept in a separate account and utilized in terms of an action plan for protection of the environment*"

AND WHEREAS, CPCB organized eight meetings during Nov, 2019 – March, 2020 regarding "implementation of cleaner technologies for control of total dissolved solids in tannery effluent" with the officials of UPPCB, CSIR- Central Leather Research Institute (CLRI) and Solidaridad-an NGO, representatives from slaughter houses and CETP operators and member tanneries of LTP Banthar & Site-II Unnao (U.P.) wherein an action plan for

control of TDS in tannery effluent was agreed upon by tanneries of Banthar and Site-II, Unnao for implementation in a phase-wise manner; and

WHEREAS, "Charter for Water Recycling and Pollution Prevention in Tanneries" (herein after referred to as 'the Charter') specific to tannery units operating in the three tannery clusters in Kanpur-Unnao region in the State of Uttar Pradesh was formulated as a part of the action plan for control of TDS in tannery effluent, which prescribes action points for implementation of in process cleaner technology and waste minimization options in a phase wise manner including self-monitoring & reporting; and

WHEREAS, the Charter envisages upgradation of the status of tannery units in terms of process technology, practices and environmental performance, besides substantial reduction of fresh water consumption, wastewater generation, solid waste generation and compliance with the prescribed environmental norms, to achieve desired level of environmental protection and to meet objectives of the Mission for Clean Ganga; and

WHEREAS, a meeting was held on June 01, 2022 under chairpersonship of Secretary, MoEF&CC for implementation of "Charter for Water Recycling and Pollution Prevention in Tanneries" which was attended by officials from National Mission for Clean Ganga (NMCG), Central Pollution Control Board (CPCB), Uttar Pradesh Pollution Control Board (UPPCB), CSIR-CLRI, Solidaridad and representatives from tanneries and slaughter houses located in Kanpur & Unnao in Uttar Pradesh and following decisions were made:

1. Cleaner technology options such as mechanical desalting, chilled/brine hides, enzyme-based low sulfide un-hairing, recycling of liming liquor, pickle-less tanning shall be implemented in three tannery clusters in organized manner through proposed charter and shall be made a part of consent mechanism.
2. Technical issues of PETP up-gradation shall be addressed by CLRI, UPPCB and NMCG.
3. Common facility for chilled/brine preserved hides may be created by slaughter houses and major suppliers for which facilitation shall be made by CPCB, UPPCB and NMCG. Supply of chilled hides could be ensured through market driven forces. Tannery should promote use of chilled /brine preserved hides and raise the demand from local suppliers and slaughter houses.

AND NOW, THEREFORE, in view of above observations and in exercise of the power conferred under section 18 (1) (b) of the Water (Prevention & Control of Pollution) Act 1974, you are here by directed to take appropriate measures for compliance of following directions in a time bound manner:

1. The compliance of the norms is mandatory and tanneries & CETPs shall not be allowed to operate with repeated non-compliance till completion of CETPs upgradation work take place.
2. Uttar Pradesh Pollution Control Board (UPPCB) shall issue directions following applicable procedure under section 33A of the Water (Prevention and Control of

Pollution) Act, 1974 to all the Tannery Units operating in three tannery clusters of Kanpur-Unnao region in Uttar Pradesh (CETP members and standalone, both) to take action for compliance of the following pollution control measures:

a. Cleaner technology options such as mechanical desalting, chilled/brine hides, enzyme-based low sulfide un-hairing, recycling of liming liquor, pickle-less tanning shall be implemented in three tannery clusters in organized manner through proposed charter and shall be made a part of consent mechanism.

b. Tannery Units shall prepare and secure the execution of their individual action plan for implementation of applicable/feasible cleaner technology/waste minimization options in their manufacturing processes including upgradation of PETP/ETP in a time bound manner and their individual action plans shall be submitted to UPPCB for approval within 30 days. The "Charter for Water Recycling and Pollution Prevention in Tanneries" placed at Annexure-I may be referred for preparation of action plans. Action plans should also include monthly/quarterly monitorable targets.

3. UPPCB shall facilitate for setting up of common facility for chilled/brine preserved hides by slaughter houses and major suppliers.

4. UPPCB shall validate and approve the action plan submitted by individual tannery units along with the plan for setting up of common facility for chilled/brine preserved hides and submit a comprehensive area specific plan for all three tannery clusters to CPCB within 45 days.

5. UPPCB shall monitor the progress of the implementation of the action plans. In case tanneries/ CETPs fail to comply with their monitorable targets of action plans and CETPs/PETPs/ETPs are observed non-compliant during inspections, appropriate action may be taken against them including levying of environmental compensation which may be linked with the progress of the action plans of the individual tanneries/CETPs. UPPCB shall also withdraw the 'Consent to Operate' issued to the tannery units in case of significant violation/ non-compliance/ non-adherence with the time schedule as prescribed under the action plans. The quarterly action taken report/progress report shall be forwarded to CPCB.

The action taken report shall be submitted by UPPCB to CPCB within 30 days from the date of receipt of these directions along with a time bound action plan for compliance of the directions.

(PRASHANT GARGAVA)
MEMBER SECRETARY

Annexure - I

Charter for Water Recycling and Pollution Prevention in Tanneries

CPCB

CENTRAL POLLUTION CONTROL BOARD

JULY, 2022

CONTENTS

1. PREAMBLE

1.1. Significance of the Leather Industry in India

The leather industry occupies a place of prominence in the Indian economy in view of its massive potential for employment, growth and exports. Endowed with the largest cattle population in the country with cheap and abundant manpower, India is well-equipped to have the comparative advantage in the production of leather and leather goods. However, the Indian leather industry suffered from a few limitations such as absence of educated labour force, lack of advanced technology etc. Of late, the country has emerged as a significant exporter with more sophisticated and value-added products. In fact, it is fast changing from a raw material exporter to an exporter of more upgraded finished products. The product range has widened and with greater innovation a substantial value addition is being secured. The latest data of the Council for Leather Exports shows:

- This sector is known for its consistency of high export earnings and it is among the top ten foreign exchange earners of the Country.
- The export of footwear, leather and leather products from India reached a value of US$ 5.07 billion during 2019-20.
- The leather industry is bestowed with an affluence of raw materials as India is endowed with 20% of world cattle & buffalo and 11% of world goat & sheep population. Added to this are the strengths of skilled manpower, innovative technology, increasing industry compliance to international environmental standards, and the dedicated support of the allied industries.
- The leather industry is an employment intensive sector, providing job to about 4.42 million people, mostly from the weaker sections of the society. Women employment is predominant in leather products sector with about 30% share.
- India is the second largest producer of footwear and leather garments in the world.
- India is the second largest exporter of leather garments and third largest exporter of Saddlery & Harness in the world.

1.2. Indian leather industry & its impact on pollution

Indian leather sector processes about 700,000 tons of rawhides and skins from around 2300 tannery units across the country per year, which results in the production of about 3 billion sq. ft of leather that amounts to about 12.9% share of the global import. The export of leather and leather products from India is about US$ 5.74 billion. The leather and leather product sectors provide employment to about 4 million people. India is the second largest producer of footwear and leather garment and fifth largest exporter of leather products and accessories. Indian leather industry generates about 20 billion liters of wastewater and about 0.5 million tons of solid wastes every year.

1.3. Kanpur Leather Clusters

Kanpur is one of the major leather clusters in India. There are three tanning clusters in the areas covering Kanpur and Unnao, namely Jajmau, Banthar and Site-II, Unnao. About 0.2 million tons of rawhides and skins are converted into finished leathers per annum from these three cluster, which accounts to about 29% of the country's leather production. There are 27 tannery units in Banthar manufacturing finished leathers and about 3 MLD of wastewater is generated from the tanneries of this cluster. And in Unnao, there are 14 tannery units manufacturing finished leathers, and generate about 1.9 MLD of wastewater. And there are about 400 tannery units of tanneries in Jajmau producing leathers and generating about 25 MLD of wastewater.

Nevertheless, the three tanning clusters of Kanpur producing leathers and leather products contribute significantly to the economic growth of the state and society, the negative environmental impacts caused by this industrial activity is indeed significant. Many crucial measures have been taken in the past to address the issue and to minimize the negative environmental impacts. These include establishment and operation of centralized wastewater treatment plants, establishment of chrome recovery units in individual tanneries, implementation of pollution reduction measures, secured landfill for solid wastes etc. However, it has been observed that the tannery units could not conform to the discharge requirements as stipulated by the Governments. The tanneries follow classical wastewater treatment system that comprises of primary treatment, secondary biological treatment and in some cases tertiary treatment. The classical wastewater treatment system even though effective in attenuating the pollution load in terms of BOD, COD, TSS, and TS, the Total Dissolved Load (TDS) cannot be reduced. Even by employing advanced treatment systems such as reverse osmosis, membrane technology, mechanical evaporation, electro-dialysis and ion exchange, the solids can only be trans-located but cannot be degraded. Therefore, the separated solids need to be disposed in a secured manner. Therefore, the TDS load can only be attenuated effectively through in-plant measures and cleaner technologies.

1.4. About the Action Plan

The action plan is designed with the objective of providing a time-bound plan for the tanneries which will pave their way the transformation to attain sustainability. The suggested solutions have been tried and tested by technical institutions and experts and are techno-commercially viable for the industries.

This plan is spread over a period of 15 months and suggest clear pathways to adopt the appropriate technologies under the phases of **short term (within 0-4 months); mid-term (within 5-9 months) and long-term measures (within 10-15 months).**

1.5. Key Stakeholders

Several stakeholders shall be involved in implementing the action plan. These include central and state level regulatory agencies (pollution control boards and the like). Also, other stake holders like leather production houses, Local associations, knowledge institutes and civil society organizations. Thus, the key stake holders concerned are as under:

- Central Pollution Control Board (CPCB)
- National Mission Clean Ganga (NMCG)
- Uttar Pradesh Pollution Control Board (UPPCB)
- Slaughter houses & tanneries
- Knowledge Institutions such as Central Leather Research Institute
- Civil Society Organizations such as Solidaridad
- Council for leather Export
- Local Industry Associations (UPLIA)

2. PROBLEMS AND CONCERNS

2.1. Deterrent to Conformity

Nevertheless, the three tanning clusters of Kanpur producing leathers and leather products contribute significantly to the economic growth of the state and society, the negative environmental impacts caused by this industrial activity is indeed significant. Many crucial measures have been taken in the past to address the issue and to minimize the negative environmental impacts. These include establishment and operation of centralized wastewater treatment plants, establishment of chrome recovery units in individual tannery units, implementation of pollution reduction measures, secured landfill for solid wastes etc. However, it has been observed that the tannery units could not conform to the discharge requirements as stipulated by the Governments. The tanneries follow classical wastewater treatment system that comprises of primary treatment, secondary biological treatment and in some cases tertiary treatment. The classical wastewater treatment system even though effective in attenuating the pollution load in terms of BOD, COD, TSS, and TS, the Total Dissolved Load (TDS) cannot be reduced. Even by employing advanced treatment systems such as reverse osmosis, membrane technology, mechanical evaporation, electro-dialysis and ion exchange, the solids can only be trans-located but cannot be degraded. The separated solids need to be disposed in a secured manner. Therefore, the TDS load can only be attenuated effectively through in-plant measures and cleaner technologies.

2.2. Initiative by CPCB

Central Pollution Control Boards has directed the tanners of these two clusters namely Banthar and Site-II, Unnao to prepare and submit a detailed action plan to reduce the TDS at source in order to eventually achieve the TDS discharge requirement of 2100 ppm. In this regard, a meeting of the stakeholders was organized by CPCB at New Delhi on 7th November 2019. During that meeting it was decided that Solidaridad and CLRI would facilitate in consultations and brainstorming of the stakeholders. Subsequently, two meetings of the stakeholders were organized at Kanpur on 14th and 21st November 2019. Tannery representatives, CLRI, Solidaridad, slaughterhouse representatives and technical personnel from chemical houses such as Stahl and Lanxess participated in the meetings. On the basis of the consensus arrived through these two meetings, this document of brief plan outline is prepared. A meeting with the tanners of Banthar and Unnao clusters was conducted on 5th December, 2019 wherein the identified cleaner technologies were presented and a consensus was arrived. The same day, a meeting between the tanners of these two clusters and the representatives from slaughterhouses was also conducted to devise mechanism and trade practices with respect to chilling of hides. Tanners of these two clusters were provided with a format to identify and enunciate their commitment to implementing suitable TDS reduction measures from the shortlisted technological measures. They were asked to provide the response in the template provided. The responses provided by the tanners are consolidated.

2.3. Objectives of the Charter Implementation Programme

The Charter suggests Bare Minimum Technology as an indication of the technology or its appropriate alternatives required for implementation by the tannery units. The Charter takes a holistic approach for pollution prevention by implementation of cleaner technology/waste minimization options in manufacturing processes, adoption of best practices, reduction in fresh water requirement and upgradation of PETPs/ETPs. The implementation of charter results in reduction in solid waste and wastewater generation, improve effluent quality, lowering effluent treatment and other waste disposal cost, additional financial revenue from by-products generated from wastes and improved environmental performance beyond regulatory norms. All time compliance with environmental

norms avoids financial losses due to imposed environmental compensations and closures, and results in increased productivity, cost savings and competitive market advantages

Compliance with the prescribed standards is mandatory, and there will be no compromise with regard to the industry meeting the prescribed standards.

Tanneries Associations, representing the tannery units operating in Banthar, Site-II, Unnao and Jajmau, Kanpur tannery clusters have expressed their commitments for implementing the charter as per the prescribed plan of activities.

3. STRATEGY

3.1. TDS Generation in Leather Manufacturing

Total Dissolved Solids (TDS) is the amount of matter both organic and inorganic that is in dissolved form in the water or wastewater. The organic TDS can be addressed in the end-of-the-pipe treatment system; the inorganic TDS cannot be attenuated by conventional end-of-the-pipe treatment approach. The chemicals and chemical products used in the leather manufacturing process are not completely absorbed by the hide or pelt or leather. A portion of the chemicals and chemical products offered is left unabsorbed and released along with the wastewater in either dissolved or suspended form. The suspended solids are removed during the primary treatment, during which they are precipitated and segregated as sludge. TDS is generated through three causes during leather manufacturing namely (a) the direct use of salt, which are released during the unit processes (b) the formation of salts due to the neutralization reactions such as deliming and basification and (c) the salts present in the chemical products, water used for leather manufacturing. For preservation and pickling common salt is used in significant quantity. As much as 50% of common salt on the weight of the hide or skin is used for preservation. This is released during the soaking process. About 10% (on the weight of pelt) of common salt is used for pickling. More than 50% of the salt used for pickling is released into the pickling wastewater and remaining is released during the subsequent processes. These two processes viz., preservation and pickling contribute to TDS, because of the direct use of salt. Direct use of salt as stated, is the primary source of TDS generation. After the liming process, the lime and sodium sulphide absorbed by the pelt and present in free and combined form in the pelt, is removed by washing and deliming. Whereas washing removes the free alkali present in the pelt; the combined alkalis are removed through neutralizing them using ammonium salts (such as ammonium chloride or ammonium sulphate). Ammonium salt reacts with combined alkali (lime) and forms either chloride or sulphate of calcium. Similarly, the sulphate ions present in the Basic Chromium Sulphate (BCS) used for tanning is neutralized during basification and neutralization by sodium bicarbonate. This leads to formation of sodium sulphate. Such neutralization reactions are the second causative routes of TDS generation. Thirdly, the chemical products predominantly the syntans and dyes contain significant quantity of salts. These are not much absorbed by the leather and therefore contributes to the TDS load.

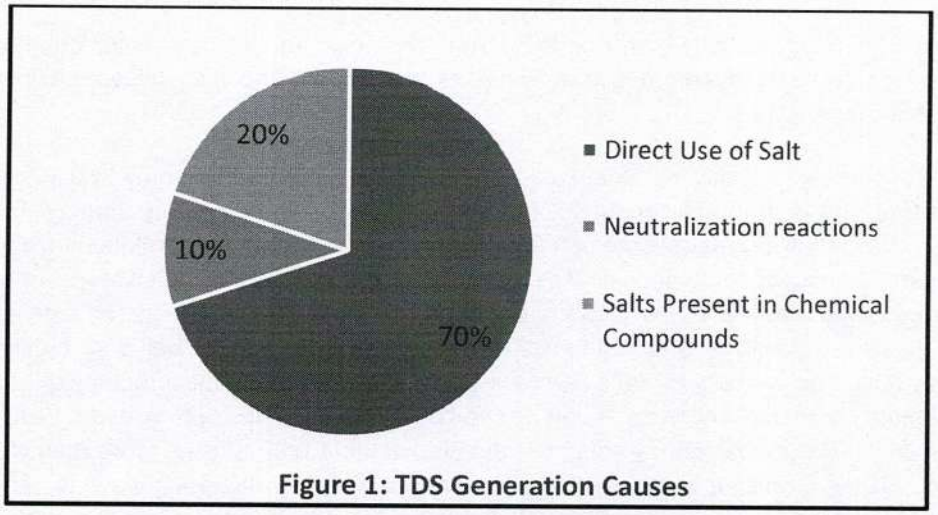


Figure 1: TDS Generation Causes

The TDS of the tannery wastewater could be as much as 20,000 ppm depending upon the TDS level of the water used for the manufacturing process. three causative aspects is given as Figure 1. Table 1, presents the pollution load of different waste streams of leather manufacturing. During soaking, the salt used for preservation gets dissolved in the water and released along with the soak liquor. The sodium chloride is the primary contributor to TDS in soak liquor. The TDS of the soak liquor could be between 22000 to 40000 ppm depending on the volume of water used for soaking process. The salt is present in the rawhides and skins in two forms namely free form and dissolved form. The total amount of salt present in the rawhide or skin is about 15-20% on the weight of the hide/skin. About 4-6% salt is present as surface salt (free form) and the remaining is present in dissolved state in the water present in the hide/skin.

Table 1: Characteristics of Waste Streams from Leather Manufacturing

Parameters (ppm)	Unit Process					
	Soaking	Unhairing and Liming	Deliming and Bating	Pickling	Chrome Tanning	Post-tanning
BOD	1100-2500	5000-10000	1000-3000	400-700	350-800	1000-2000
COD	3000-6000	10000-25000	2500-7000	1000-3000	1000-2500	2500-7000
TS	25000-40000	25000-35000	3000-8000	30000-70000	25000-60000	3000-8000
Cr	---	---	---	---	2000-5000	40-100
Cl^-	15000-30000	4000-8000	1000-2000	20000-30000	15000-25000	500-1000
TDS	22000-40000	20000-25000	1500-4000	29000-67000	24000-57000	2400-7000

The unabsorbed soluble lime (calcium oxide) and sodium sulphide are the sources of TDS in the liming wastewater. About 5-6% of lime and 2.5-3.5% of sodium sulphide is used for liming. And for reliming, about 2-4% lime is used. The pelt absorbs only about 1-2% of lime and about 1 % of sulphide and the rest is released along with the liming wastewater.

Apart from the inorganic TDS contributions from the lime and sodium sulphide, the liming wastewater also contains organic TDS, contributed by the proteins and lipids released from the hide or skin during the process.

Majority of the lime remains as sludge as the solubility of lime is limited only to 0.16 grams per litre. As stated, the pelt absorbs about 2% of lime and 1% of sulphide during limning. The alkalis absorbed by the pelt are present in the pelt in two forms viz. free form and combined form. The free alkalis are not chemically combined with the pelt but present physically in the water present in the pelt. The combined alkalis are chemically bound with the proteins of the pelt. The free alkalis are removed by simple washing, and combined alkalis are removed during deliming by the use of ammonium salts. The ammonium salts react with lime and form calcium chloride or sulphate salts and ammonium hydroxide. These contribute to the TDS in the deliming waste streams. Pickling is the process, in which about 10% (on the weight of the pelt) common salt is used. More than 40% of the salt offered during pickling is not absorbed and released along with pickling wastewater. Pickling process is one of the major contributors to TDS load next to soaking. In chrome tanning about 6-8% of Basic Chromium Sulphate (BCS) is used. The pelt absorbs about 65% of the BCS offered and the remaining is discharged along with the wastewater. During chrome tanning, sodium formate and

sodium bicarbonate are also used for fixing the BCS (basification). The residual BCS and chemicals along with the chemical formed during the basification (sodium sulphate), and the salt absorbed by the pelt during pickling contribute to TDS in the chromium tanning wastewater. Chromium wastewater is sent to chromium recovery plant, where the chromium is precipitated and regenerated to render the same amenable for reuse. The supernatant solution during chromium precipitation is another major contribution to TDS load. A wide range of chemical products and dyes are used in wet finishing. The leather absorbs only about 70% of these chemicals and chemical products. The unabsorbed chemicals contribute to TDS. Though the TDS of the wet-finishing wastewater is relatively lower, the TDS contributing matters are predominantly not easily biodegradable.

3.2. Bare Minimum Technology

It is proposed to introduce, implement and ensure regular practice of technologies and technical measures for (a) alleviating the generation of TDS or (b) minimizing the TDS at source. Depending upon the preparedness of the tannery units, requirement for capital investment, standardization requirements, knowledge and skill of personnel, the technological solutions and technical measures are categorized into three namely (a) short-term measures, (b) medium-term measures and (c) long-term measures. These are presented as Table 2.

Table 2: Matrix of Technological Measures

S. No.	Intervention	Reduction in parameter	Tentative Cost (in INR)	Action Plan classification
1	Use of green hides	Elimination of Cl and TDS	Capital cost at slaughter hose (5 tons per day): Rs. 80 lakhs, Capital cost at tannery (5 tons per day): Rs. 30 lakhs	Medium-term
2	Processing of chilled hides	Elimination of Cl and TDS	No additional cost	Long-term
3	Procurement of Brine cured hides	It helps to significantly reduce the Total Dissolved Solids (TDS) by around 50%		Medium-term
4	Mechanical desalting of raw hides	A way to effectively reduce the Total Dissolved Solids (TDS) by 30-35% at soaking stage	130,000 per machine	Short term
5	Installation of Bar Screens	Reduces the floating matter which leads to reduction of Total Suspended Solids (TSS)	10,000-12,000 per screen	Short term
6	Installation of water meters on drums	Installing water meters on drums saves around	30,000 per meter	Short term

		35% of water in the drum operations		
7	Installation of Smart Water Saving System	This system helps to save around 50% of water use in tanning operations	3,50,000 for a tannery of 5 drums	Short term
8	Installation of solenoid valves on fleshing machines	Saves around 50% of fresh ground water which was otherwise discharged as waste	10,000 per machine	Short term
9	Low salt pickle tanning	Reduces water use by 40% Reduces TDS by around 40%, TSS by around 20%, COD by around 27%, BOD by around 30%	It is associated with the process change. The operation cost is almost at par with the conventional method	Medium-term
10	Enzyme based unhairing	Effectively reduces various effluent parameter TDS- 40%; TSS-50%; BoD-45%; CoD-50%; Na2S- 90%	It is associated with the process change. The operation cost is almost at par with the conventional method	Medium-term
11	Drum Screeners	Helps to separate out the hair and finer floating particles in waste water stream and effectively reduce the TSS of effluent	Around 2,50,000 per equipment	Short term
12	Upgradation of primary effluent treatment plants in tanneries	Helps to meet the regulatory discharge norms	Variable as it depends on the kind of modification required in the design for a particular tannery	Medium-term
13	Electro Oxidation based zero waste discharge	Helps to completely treat the effluent water and re-use in the system	Variable, as the size and capacity of the plant, depends on the tannery's processing capacity	Long term
14	Establishment of common tallow extraction facility	Helps to effectively utilize the fleshing	Needs to be assessed and a methodology has	Long term

		waste generated from the industry	to be defined on how stakeholders can come together to establish this facility in cluster	
15	Conversion of fleshing waste to biogas	Effectively utilize the fleshing waste to biogas	3,50,000 to process 100 kg of fleshing waste	Long term
16	Mechanism to separate lime sludge	Helps to separate out lime sludge which reduces the TSS in effluent. The sludge can be effectively utilized to make paver blocks	Remarks: This intervention will establish a new revenue stream by creating a "waste to value model" and would also provide green jobs to workers	Medium-term

3.2.1. Details of Technological Solutions

Chilling:

Hides at the slaughterhouse may be blast chilled and transported in chiller trucks to the tanneries. The chilled hides may be stored for about a month. The tanneries for managing the raw material supply and production may have chiller storage for 2 days of production. Processing of chilled hides averts total elimination of common salt.

Benefits of this technology
- Complete elimination of salt

Environmental benefits
- No Cl and TDS in soak liquor

Tentative Cost
Capital cost at slaughter house for 5 tons of hides is Rs. 80 lakhs and at tannery is about Rs. 30 lakhs.

Action Plan
This is identified as one of the long-term measures.

Processing of Green hides:

Hides from the slaughterhouses may be supplied just-in-time to the tanneries. And the tanneries may process the green hides. The limitation is the proximity of the slaughterhouse to the tanneries. Therefore, this measure is applicable only to a limited extent and only to the tanneries that are located near slaughterhouses.

Benefits of this technology
- Complete elimination of salt

Environmental benefits
- No Cl and TDS in soak liquor

Tentative Cost
No additional cost.

Action Plan
This is identified as one of the medium-term measures.

Desalting of raw hides:

This technology aims to address the presence of high Total Dissolved Solids (TDS) load in the discharge outlet wastewater from the tannery. This TDS load primarily comes from dissolution of salt during soaking operation of salt preserved hides and skins. Presence of high salt in the wastewater, eventually reduces the efficiency of the secondary effluent treatment plant. This intervention is focused on TDS reduction during soaking of hides and skins in water. Total Dissolved Solids is the most challenging pollutant in the effluent coming out of the tannery along with other pollutants like Chromium, Sulphide etc. Tannery effluents carry heavy TDS loads due to a massive presence of salts on the raw hides applied for curing purposes. Hence, there is a need to revamp leather processing

methods for the sustainability of leather industry. Some of the novel concepts in leather processing are included which helps in to reduce TDS from the effluent in sustainable and economical way. The desalting machine helps to remove the salt applied on the raw hide before putting it into the soaking process. This action helps in to remove the salt to reduces TDS in the soak liquor and eventually in combined effluent going to treatment plants.

In lieu of the above stated problem, a desalting machine can help to mechanically dust the salts on hides/skins. This machine has a simple engineering design and is made up of SS grade steel frame and wooden platform on both working edges. The machine has a cylindrical roller with nylon bristles embedded on the end section the frame with pulley arrangement.

Benefits of switching to this technology

- Brush the salt present on flesh side of the hide
- Easy to use and operate
- Reduce TDS by 30-35% during soaking operation
- Easy to relocate at several working location with wheels
- Cost effective and easy to use
- Rolling speed of 400 rpm efficiently removes salt from flesh side
- 2.24Kw power used (may vary depending upon substrate)
- Long Life and easy to maintain
- Customizable as per requirement of tanners
- Scalable up to 3 brush rollers to increase the efficiency of the machine

Environmental benefits

- The decrease in TDS in the effluent will help the biological treatment work more efficiently, due to less salinity.
- The cost of treatment at the effluent plant will also get reduced.
- The second soak water can be used as first soak in the next batch resulting in significant reduction in the use of fresh water in soaking operations.

Tentative Cost

The simple brush type desalting machine costs INR 1,30,000.

Action Plan

This intervention is extremely easy to install and will have immediate impact on the reduction of TDS and can be implemented in the tannery's shopfloor in the **short term**.

Installation of Bar Screens:

In leather processing, the end of the pipe treatment technologies plays a major role in the efficient functioning of CETP. Floating matter is one such important area of concern, which adds to the TSS and may lead to the choking of the collection and conveyance network.

Installation of Bar screens is an effective way to block the flow of floating matter/coarse material in the effluent streams. Since, the floating matter further pulverises in the pumps and increase the TSS (Total Suspended solids) therefore, this intervention will help to improve the efficiency of collection and conveyance network.

Benefits of installing bar screens

- Helps to block/reduce the flow of floating matter in effluent discharge streams
- Helps to reduce the TSS load in primary effluent treatment facility
- Helps to reduce the choking of pipelines and conveyance channels.

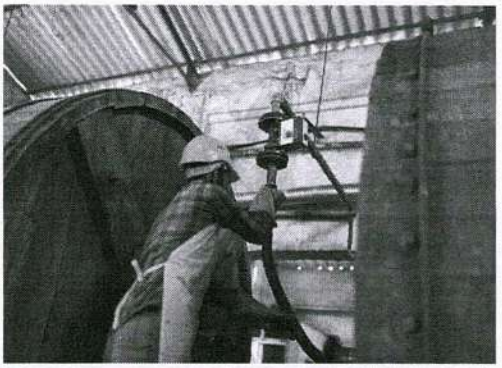
Tentative Cost

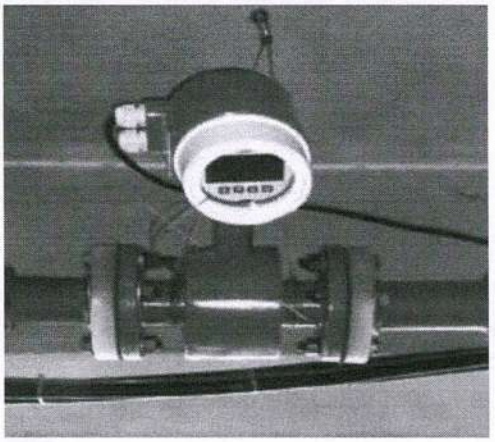
- Installation of a set of 4-5 bar screens costs INR 40000-50000 per tannery.

Action Plan

- This intervention is extremely easy to install and will have a steady impact on the reduction of TSS and can be implemented in the tannery's shopfloor in the **short term**.

Installation of water meters on drums:





In the leather production, processes ranging from soaking to post- tanning stage in tanneries, maximum large quantity of water is required. However, in many small- and medium-sized tanneries, the volume of water used during the process is not measured but only visually estimated. This estimation usually results in higher utilization of water than the volume actually required, leading to large generation of wastewater. In the leather processing, water acts as a medium between the hides/skins and chemicals by (a) removing undesired materials from hides/skins and (b) facilitating the reaction between chemicals and hides/ skins. Water consumption in the processes of a tannery unit depends on the unit processes, type of raw material, finished product, process vessels (drums/paddles), chemicals, availability of water, and legal restrictions. In leather cluster, the tanneries range from small to medium-sized with varying products and production processes and thus have different water intake levels. Therefore, installation of water meters on drums will help to provide optimize and reduce the water use and therefore, minimize the waste water generated.

Benefits of the meter

- Reduced water consumption lowers the cost of effluent treatment, and improves the efficiency of treatment
- Batch to batch quality consistency
- Reduction in quantity of chemicals, particularly post tanning chemicals
- Reduction in water use in drum operations by around 35-40%

Tentative Cost: The cost of installing one water meter is approximately INR 30,000.

Action Plan

This intervention will have immediate impact on the reduction of water use in tanning operations and can be implemented in the tannery's shopfloor in the **short term**.

Installation of solenoid valves on fleshing machines:

The fleshing machine is used to remove the fatty layer from the hides and skins. During the fleshing operation, large volume of running water is presently used to provide lubrication to the hides/skins. The water continues to flow even while the operators are engaged in the tedious jobs of picking the hides from the surface. However, in contrast, the water is required, only when the hides/skins touch the surface of the fleshing machine.

To control continuous flow of water during fleshing operation, a switch which is connected to Solenoid Valve can be placed below the paddle. Flow of water starts as soon as paddle is pressed by foot of operator and flow stops when foot is taken off from paddle. It has been observed that by installing Solenoid Valve on Fleshing Machine, it is possible to reduce water use by more than 50% thus saving huge quantity of water which would have otherwise increased the volume of effluent.

Benefits of intervention

- Save approximately 50% fresh usable ground water.
- Reduction in treatment of Effluent volume at PETP level due to reduction in volume of process water. Fully adjustable depending upon the thickness of raw material.
- Long life and very low maintenance cost.

Tentative Cost: The cost of installing one water meter is approximately INR 10,000.

Action Plan

This intervention will have immediate impact on the water use in fleshing operations and can be implemented in the tannery's shopfloor in the **short term**.

Pickle-free tanning technologies:

Conventional chrome tanning in leather processing discharges significant amounts of chromium, total dissolved solids and chlorides. Hence, tanners are looking for new product-process innovations towards low-waste and high exhaust chrome tanning. Such technological solutions are provided by CSIR Central Leather Research Institute, Stahl and others.

(a) **Low salt pickling agent:** A chemical, for carrying out low pickle chrome tanning using commercial basic chromium sulphate. This method enhances the uptake of chromium to above 90%. The product offers full, soft leathers having a shrinkage temperature comparable to that of conventional chrome tanned leathers. This integrated process provides reduction in chemicals, water, time and power consumption. Further, the novel product-process helps to reduce the chemical oxygen demand (COD), total dissolved solids (TDS) and water up to a significant level. Thus, the novel product/process developed not only seeks advantages in reducing pollution loads but also seems to be techno-economically viable.

Benefits:

- Reduces water use by 40%
- Reduces TDS by around 40%, TSS by around 20%, COD by around 27%, BOD by around 30%

Tentative Cost: It's a practice change and the cost are almost at par with the conventional method

Action Plan: This process involves multiple trials with the help of experts and has to be standardized setting the requirement of tannery's shopfloor, therefore, it can be implemented in **mid-term.**

(b) **Waterless Chrome Tanning developed:** The primary innovation of this technology is no use of water. And there is no necessity to carry out pickling process, which is associated with the use of acid and salt.

Benefits:

- Complete elimination of water input for chrome tanning
- No discharge of wastewater
- from chrome tanning
- Total elimination of pickling and basification
- Comparable shrinkage temperature to that of conventionally tanned leathers
- High chrome content in leather

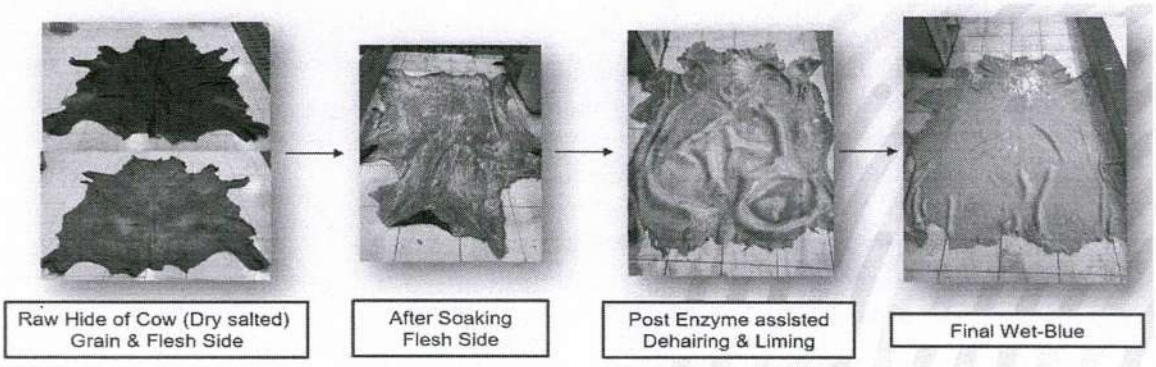
Tentative Cost: It's a practice change and the cost are almost at par with the conventional method

Action Plan: This process involves multiple trials with the help of experts and has to be standardized setting the requirement of tannery's shopfloor, therefore, it can be implemented in **mid-term.**

Enzyme Assisted Unhairing:

Lime/sulphide is widely used in hair removal because it is more efficient and cheaper than other currently available technologies. In the conventional unhairing process of leather manufacture, animal skins are subjected to a drastic chemical treatment using lime and sodium sulphide. Sulphide reduces disulphide bonds in keratin present in hair and epidermis and thereby detaches and digest them from hides or skins. The sulphide present in the effluent comes from lime waste liquor and from compounds used in the processing of hides including surfactants and unhairing agents, such as sodium sulphide (Na_2S). Sulphur is found in effluents in the form of sulfates and sulphides. The risk of hydrogen sulphide (H_2S) formation during effluent treatment poses a serious environmental problem.

Enzyme assisted un-hairing is an eco-friendly intervention that reduces nearly TDS- 40%; TSS-50%; BOD-45%; COD-50%; Na_2S- 90%. The enzyme is proteolytic in nature and is commercially available.



Tentative Cost: It's a practice change and the operational cost is almost at par with the conventional method.

Action Plan: This process involves multiple trials with the help of experts and has to be standardized setting the requirement of tannery's shopfloor, therefore, it can be implemented in **mid-term.**

Upgradation of primary effluent treatment plants in tanneries:

Purpose of primary treatment plant at the individual tanneries is to remove grit, readily settable solids and colloidal matter by adding coagulant like alum, lime and polyelectrolyte. This will also reduce the clogging in the tannery wastewater collection network. It helps to effectively meet the regulatory discharge norms.

The intervention required to upgrade the treatment facilities vary from tannery to tannery. To meet the discharge norms, it is vital to have at least a proper screening system, appropriate capacity of the equalization tank to provide the desired retention time, primary settling tank with appropriate retention time, chemical dosing systems to precipitate the sludge and sufficient area for sludge drying beds or mechanical dewatering systems.

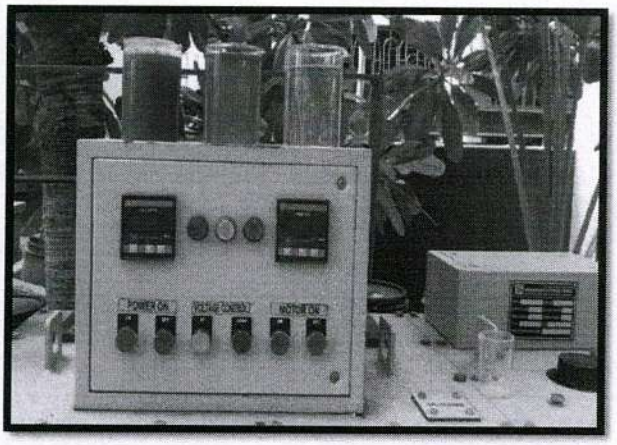
Tentative Cost: Variable as it depends on the kind of modification required in the design for a particular tannery

Action Plan: With the help of technical expertise, a tailor made PETP upgradation plan can be finalized for each tannery, based on which the required alterations can be made in the **mid-term.**

Electro oxidation based zero waste discharge:

The Electro-oxidation (EO) process is an alternative for ZLD unit for the tannery unit. The wastewater treated through the Electro oxidation mechanism can be reused in the processes.

The EO machine have Nickel and Platinum coated electro plates that will help to break the organic molecules present in the wastewater through the action of DC current. The electric current passing from the wastewater breaks down the organic and sulphide molecules that results in clear water as a by-product of the electro oxidation process. **This technology is effective and useful for the stand-alone tanneries in Unnao and Banthar region.**



Benefit:

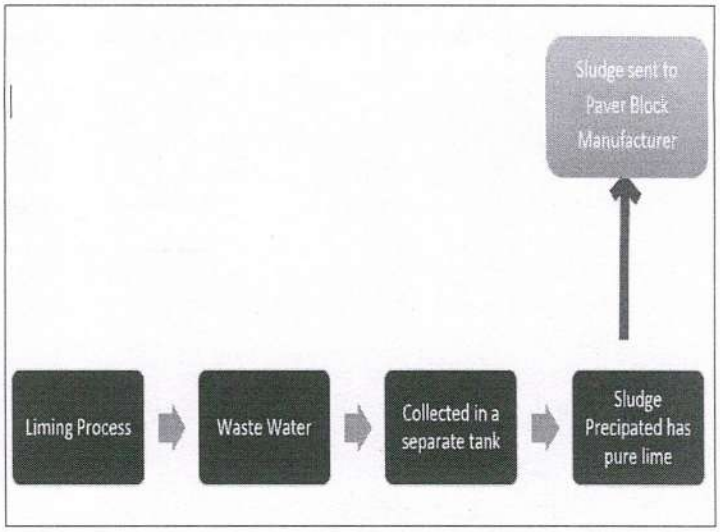
- No waste water discharge outside the tannery
- Reduced use of fresh water due to availability of treated water for operations
- Enhanced compliance and reduced risk of tannery closures due to non-compliance.

Tentative Cost: It is variable based on the size and processing capacity of the tannery.

Action Plan: Requires sizable investment and can be implemented in **long-term.**

Mechanism to separate lime sludge from the effluent discharge:

Each tannery requires minor infrastructural modification to separate out a waste water stream from the liming process and collect the lime liquor in separate tank. By doing so, the lime sludge settles at the bottom of the tank and the supernatant liquor has a reasonably good quality and can be re-used in the liming process again. The collected lime sludge can then be separated out and can be utilized in manufacturing paver blocks. It costs a significant amount of money to transfer this sludge to the landfill and this adds to land, water and air pollution. The economic potential isn't realized. The solid waste (lime sludge) which can be effectively utilized in making paver blocks, is only getting piled on in the land and when it percolates deep into the land, it contaminates the ground water, putting at risk the entire surrounding ecosystem.



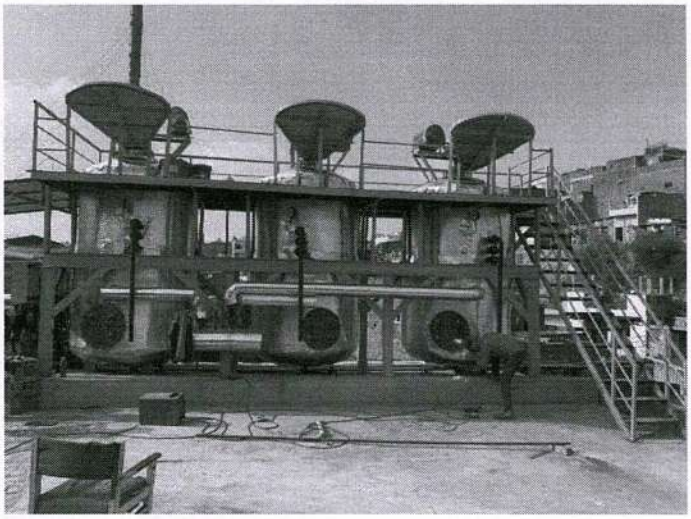
Benefit: effectively separate out the lime sludge and utilize it in making paver blocks which have a proven business model and creates a scope of green jobs.

Tentative cost: Minor infrastructural changes, which vary from each tannery.

Action Plan: Requires capacity building and awareness. Can be conducted in **mid-term**

Establishment of a common facility to utilize the fleshing waste to tallow oil:

Conversion of now tanned fleshing waste to tallow oil has been pilot tested in Kanpur-Unnao region and has show cased convincing results. The tallow oil finds its applicability in many industries such as paint, cosmetics etc. A plant that can effectively convert 9 tonnes of fleshing per day into tallow oil has been established in Jajmau. This innovative "waste to value" solution has a huge market potential and ability to provide green jobs.



Benefit: The issue of fleshing (solid waste) can be addressed successfully and this is also could bring about financial revenue.

Tentative cost: Needs to be assessed and a methodology has to be defined on how stakeholders can come together to establish this facility in cluster.

Action Plan: can be implemented in **long run.**

Conversion of fleshing waste to biogas:

The application of biogas technology for the degradation of leather industry fleshing is an attractive method to recover energy from tannery waste Hide/skin fleshing contains sufficient quantity of nutrients necessary for the growth and metabolism of anaerobic bacteria for biogas production. With advancements in the digestion technologies and availability of microbes, the process is now seeming viable and economically acceptable by industries. Anaerobic digestion systems have the potential to convert tannery fleshing into energy efficiently and achieve the goals of pollution prevention and reduction. With the proper scientific methodology, recovery of biomass energy potential as biogas, and production of stabilized residue for use as organic fertilizer (after stabilization) can be achieved.

If decentralized digester units are not available as enough waste is not generated to make the facility economically attractive; a large-scale co-digestion plant is a recommended option for a cluster of tanneries. It reduces the quantity of landfilled waste and recovers its energy potential, making the facility economically attractive. The effectiveness of the technology has been tried and tested in Kanpur.

Benefit: The issue of fleshing (solid waste) can be addressed successfully and this could also bring about financial revenue.

Tentative cost: A detailed project proposal stating the specifications such as availability of raw material, space, discussions with stakeholders has to be prepared to estimate the cost of the common facility

Action plan: can be implemented in **long-run**

Drum Screeners:

Tannery wastewater is treated in the PETP where a lot of sludge is precipitated that increases the treatment cost. Therefore, a drum screener fixed at the inlet of PETP will enable the separation of fine hair and other floating particles and therefore reduce the Total suspended solids (TSS) of the waste water entering the PETP. This also helps to enhance the effectiveness of treatment.

Benefit: Effective pre-treatment and better management of solid waste.

Tentative cost: The cost is around **INR 2,50,00.**

Action plan: It can be implemented in **short term.**

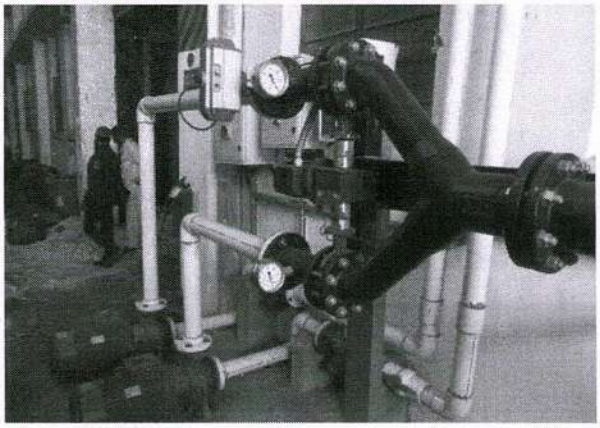
Smart Water Saving System:

This system helps to automate the entire water feeding system in the leather processing in tanneries especially in the beam house operations. It provides an opportunity to avoid human errors and same time improves also working environment and safety. Automated water feeding/mixing system are therefore very useful to improve efficiency and quality of the production.

Benefits:

- Automated water supply in operations

- Avoid human errors
- Reduce water use by around 50%
- Reduces the volume of waste water generated



Tentative Cost: INR 3,50,00 for a tannery with 5 drums.

Action Plan: It can be implemented in **short term.**

Summary of the technological measures is presented as Table 3.

Table 3: Summary of Technological Interventions

S. No.	Parameter	Intervention
1.	Total Dissolved Solids (TDS)	• Procuring brine cured hides • Processing of green hides • Processing of chilled hides • Mechanical desalting • Low salt pickling Enzyme assisted dehairing
2.	Total Suspended Solids (TSS)	• Installation of Bar Screens • Installation of Drum Screeners • Upgradation of Primary Effluent Treatment Plants • Low salt pickling • Enzyme assisted dehairing
3.	Chromium (Cr)	• Waterless Chrome Tanning • Chrome Recovery
4.	Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD)	• Low salt pickling • Enzyme assisted dehairing
5.	Water Saving	• Installation of Water meters on drums • Smart Water Saving System • Retrofitting of fleshing machines by Solenoid valves
6.	Waste to Value Solutions	• Separation of lime sludge and conversion into paver blocks • Fleshing waste to Biogas • Fleshing waste to Tallow Oil
7.	Compliance to all discharge parameters and water saving (much suitable for isolated/stand-alone tanneries)	• Electro-oxidation based zero discharge

3.3. Strengthening of Environmental Management Cell and Laboratory in Industry to ensure improved Environmental Compliance

CREATION OF ENVIRONMENTAL MAANGEMENT CELL (EMC)

Every unit will compulsorily set up an Environmental Cell to effectively monitor the environmental compliance. The Environmental Cell will constitute of:

- Unit / Business Head
- PETP/ETP In-charge
- Process Operations Heads

The EMC shall conduct fortnightly meetings to discuss on the environmental issues. The EMC may also have member from Third Party engaged by them for planning and implementation of charter.

Duties of Environmental Management Cell

- The Environmental Cell shall review the water consumption, measures taken and identify the areas for water conservation and waste minimization, resource recovery & pollution reduction every week in terms of effluent quantity and quality, solid waste generation and reduction in chemicals used.
- A detailed minutes of the decisions taken will be recorded and circulated to all members of Environmental Cell and follow up of the decisions will be monitored by the Unit Head, PETP/ETP and process Incharge
- Review to be made in case of non-compliance by any unit
- Internal Audit to be done by the EMC on quarterly basis
- External Environmental audit on annual basis.

SETTING UP OF LAB FACILITY AT TANNERY FOR EFFLUENT ANALYSIS

Basic testing facility for PETP/ETP effluent quality norms be created at individual tannery for pH and TDS/FDS while facility for TSS, COD, BOD, Chloride, Sulphide, Ammonical nitrogen, Total Chromium, also for pH and TDS/FDS will be created at the CETP, which will be availed by the member units or the participating tanneries can avail facility of any third party lab for the same or can develop their own facility. Daily analysis of PETP/ETP quality carried out & log book be maintained.

(a) Minimum Analysis Facilities for pH, TSS, TDS/FDS, Chloride, Sulphide, & total Chromium

(b) Appointment of scientific and technical staff

(c) Training of the Staff

(d) Frequency of the Analysis

Parameters	Frequency of sampling
pH	Daily (by individual unit)
TSS, mg/l	Weekly
TDS/FDS, mg/l	Daily (by individual unit)
Chloride, mg/l	Weekly
Sulphide, mg/l	Weekly
Total Chromium, mg/l	Weekly
Flow (KLD)	Daily (separate records for batches)

Key guidelines for Operation & Maintenance of PETP/ETP

- Ensure proper and optimum conditions as per the designed specification.
- Avoid fluctuation in effluent flow and pollution load so as to reduce the shock load to the PETP/ETP system as a whole.
- Ensure proper addition of treatment chemicals (coagulant).
- Ensure periodic & timely withdrawal of sludge from the settling units.
- Proper maintenance of electric motors and pumps etc.

Documentation

Fresh water consumption, effluent discharge, effluent analysis, disposal of dry sludge and other solid waste generated from the fleshing, trimming and shaving operations, and PETP/ETP chemical & utility (like power) consumption to be properly recorded.

4. PROJECT MANAGEMENT SYSTEM

4.1. Implementation Plan

It is planned to carry out these measures in three phases, as given below.

Phase I: Implementation of immediate measures - 0 to 4 months

Phase II: Implementation of medium term-measures - 5 to 9 months

Phase III: Measures for compliance to TDS norm and preparation for sustainability (long-term measures) - 10 to 15 months

Under phase I the TDS reduction from the processes namely preservation, soaking, liming, pickling and chrome tanning will be carried out. Under Phase II, TDS measures in neutralization and deliming will be carried out. And under phase III, TDS reduction measures in wet-finishing and techniques for achieving the TDS norm will be implemented.

As stated, it is planned to carry out the work in three phases. The first phase will address the implementation of the immediate measures. The immediate measures have been identified on the basis of the plausibility for reducing the TDS load, capital requirement and preparatory measures. As it is understood that the soaking, liming and pickling are the unit processes where the TDs generation is significant. Therefore, the immediate measures should be to reduce the TDS in these three processes. However, as reducing TDS in soaking is dependent on the measures connected to salt-free preservation, which demands establishment of chiller and other capital entities, the same is considered for phase II. Therefore, for the first phase it is planned to implement the measures connected to reducing the TDS in liming and pickling (as well as chrome tanning). And during the period of phase I, the preparatory measures such as establishment of chiller facility, common warehouse and other related entities will be carried out. And in phase II, implementation of measures connected to salt-free preservation and soak liquor management will be carries out. Under phase III, the measures connected to addressing the TDS issue in wet-finishing is planned.

4.2. Plan of Activities and Targets

The plan of activities and possible targets values are described in Table 4, 5 and 6.

Table 4: Short-term Measures: Target

S. No.	Intervention	Parameter to be Addressed	Possible Target
1	Mechanical desalting of raw hides	TDS of wastewater of first Soaking	Not more than 30,000 ppm
2	Installation of Bar Screens	Reduction in gross solid matter	Removal of solid matter by 50 g for every Kg of raw material.
3	Installation of water meters on drums	Water saving.	Saving in water by a minimum of 2 L per Kg of raw material.

4	Installation of Smart Water Saving System	Water saving.	Saving in water by a minimum of 2 L per Kg of raw material.
5	Installation of solenoid valves on fleshing machines	Water saving and wastewater reduction.	Saving of water 20 L per ton of raw material.
6	Drum Screeners	Reduction in gross solid matter	Removal of solid matter by 50 g for every Kg of raw material.

Table 5: Medium-term Measures: Target

S. No.	Intervention	Parameter to be Addressed	Possible Target
1.	Processing of green hides	No Cl in soak liquor	Cl - BDL
2	Processing of Brine cured hides	TDS of wastewater from first Soaking.	Not more than 28,000 ppm
3	Pickle-free tanning or waterless chrome tanning	Pickle wastewater TDS of tanning liquor	No pickle wastewater Not more than 35000 ppm
4	Enzyme based unhairing	BOD of lime liquor Sulphide of lime liquor	Maximum 8000 ppm Maximum 5000 ppm
5	Upgradation of PETP/ETP	TSS of composite wastewater Cr of composite wastewater	Maximum 600 ppm Maximum 10 ppm

Table 6: Long-term Measures: Target

S. No.	Intervention	Parameter to be Addressed	Possible Target
1	Chilled hides	Cl and TDS	Cl - BDL
2	Electro Oxidation based zero waste discharge	Wastewater discharge	No discharge of wastewater
3	Establishment of common tallow extraction facility	Fleshing utilization	Utilization of fleshing to the tube of 100 g for every kg of raw hide processes
4	Conversion of fleshing waste to biogas	Fleshing utilization	Utilization of fleshing to the tube of 100 g for every kg of raw hide processes

5.0 SELF-MONITORING AND REPORTING

Implementation of the Charter and to comply with the prescribed norms/ standards shall be the sole responsibility of the individual tannery unit. The entire cost towards implementation of the Charter shall be borne by the individual tannery. Tanneries shall carry out all the activities related to self-assessment, preparation of action plan, including PERT Chart, implementation of the Charter and self-compliance reporting. Participating units may take technical/ logistic assistance of experts or their associations for carrying out various activities as per the Plan of Activities. Some of the activities to be carried out by the individual units on their own or through their experts/ associations are as under:

1. Preparation of inventory of existing process technologies and practices.
2. Identification of process technological up-graduation requirement w.r.t. the Charter.
3. Preparation of Action Plan, including monthly PERT Chart for implementation of the Charter for technological and process up-gradation.
4. Implementation of technological up-gradation action plan and submission of monthly progress report.
5. Preparation of PETP/ETP adequacy assessment report w.r.t. environmental compliance, actual production, pollution load generation and targeted water consumption; and design, drawing and preparation of proposed augmentation and up-gradation plan, including monthly PERT Chart in accordance with the Charter
6. Implementation of PETP/ETP up-gradation action plan and submission of monthly progress report.
7. Installation of
    a. sealed electromagnetic flow meter along with totalised flow on bore wells
    b. water meters at drums,
    c. smart water saving system,
    d. solenoid valves on fleshing machines
    e. bar screens
    f. drum screeners.
8. Setting up of online flow meter/ V notch (@ 60° or 90° angle) to monitor final effluent discharge.
9. Maintenance of log book to record daily water drawl from bore wells.
10. Maintenance of log book for recording daily water consumption in individual process unit.
11. Setting up of maximum water consumption targets for individual unit operation.
12. Report preparation of existing water and raw material consumption, reuse/ recycle practices, strategies/ work plan to achieve fresh water consumption reduction, process technology upgradation, chemical reduction, PETP/ETP upgradation, waste minimization and pollution reduction targets.
13. Implementation of reuse/recycling action plan and submission of monthly progress report.
14. Maintenance of log book for recording disposal of dry sludge and other solid waste generated from the fleshing, trimming and shaving operations Self-monitoring and reporting: Daily/weekly PETP/ETP performance monitoring and maintain Log Book as per the prescribed format.
15. Participation in periodic review meeting to be held by Third Party (tannery associations/ CLRI/Solaridard)/ UPPCB.
16. Strengthening of Environmental Cell and Laboratory facilities
17. Organising training programme for their personnel.

(a) **Empanelled Experts**

Third Parties (Tannery Associations/ CLRI/Solaridard) may be engaged by tanneries or their associations for preparation of assessment reports, action plans for process & PETP/ETP up-gradation, effluent sample analysis etc. The empanelled expert(s) will provide technical support to individual unit or associations in implementation of the Charter.

(b) **Third Party**

Each of the participating tannery unit have to join either any one of the identified Third Parties or UPPCB for evaluation & validation of their technical reports (self-assessment and planning reports: Preparation of inventory, PETP/ETP Adequacy & upgradation, and Action plans to implement the Charter), and physical verification of their progress reports under the Charter implementation programme.

Third Party shall play pivotal role in encouraging their member tanneries in implementation of the Charter and shall facilitate individual tannery by arranging technical and logistic supports. Tannery Associations/ CLRI/Solaridard have been identified as Third Party to facilitate the industry in implementation of the Charter and monitoring.

The tannery Associations shall engage Expert Institutions like CLRI/IITs/ NEERI/ NPC/ HBTU /any other reputed environmental consultants/ organisations or set up Expert Committee(s) for evaluation & Validation of technical reports submitted by the participating tanneries and physical verification of the progress reports.

Third Parties:

1. Central Leather Research Institute (CLRI)
2. Solaridard
3. Tannery Associations of Banthar, Site-II and Jajmau tannery clusters

Participating tanneries will have option to select and join any one as the Third Party from the list of third parties. Once joined the selected Third Party, the participating mills shall not be allowed to change their selected Third Party for a period of at least one year and change of third party will be allowed only after written permission from UPPCB.

The Third Party shall perform following activities:

- ✓ Preparation of list of experts/ Institutions to facilitate tanneries in preparation of self-assessment & planning reports
- ✓ Engagement of Expert Institutions like CLRI/IITs/ NEERI/ NPC/ HBTU /any other reputed environmental consultants/ organisations or setting up of Expert Committee for Evaluation & Validation of following reports Submitted by the participating Tanneries
  - ➢ PETP/ETP adequacy assessment report, design / drawings and proposed augmentation/ upgradation plan as per Charter
  - ➢ Inventory, upgradation requirements and action plan for process upgradation

- Work plan by tanneries for reduction in specific water consumption/ effluent generation.

Initial Phase

1. Evaluation & validation of individual tanneries Action Plan, including PERT Chart for implementation of the Charter for technological and process up-gradation.
2. Evaluation & validation of individual tanneries PETP/ETP adequacy assessment report w.r.t. environmental compliance, actual production, pollution load generation and targeted water consumption; and design, drawing and proposed augmentation and up-gradation plan, including PERT Chart in accordance with the Charter
3. Evaluation & validation of individual tanneries assessment report of existing process, water consumption- section wise, reuse/ recycle practices, disposal of sludge and other solid waste generated, maintenance of log books, and their strategies/ augmentation and up-gradation work plans to achieve fresh water consumption, waste minimization and process upgradation targets, including PERT Chart in accordance with the Charter

Quarterly Activities

1. Verification of progress made by individual tanneries on upgradation of process technology / PETP/ETP and recycle / reuse as per their action plans
2. Verification of individual tanneries on fresh water consumption, effluent generation, effluent quality and water recycling achievement etc.
3. Verification of progress reports submission by participating tanneries
4. Compilation of Charter Implementation Status Report for Submission to UPPCB/ CPCB
5. Compilation of PETP/ETP performance report for submission to UPPCB/ CPCB
6. Organising Quarterly review meetings with participating units/ UPPCB/ CPCB/NMCG

Periodical: Organise training/ workshop programmes on process technology & best practice, ETP operation & maintenance, sampling & analysis, etc. for unit personnel

Cost of engaging third party/expert will be borne by the participating tanneries. Participating tanneries shall pay/ reimburse fee to their selected Third Party towards meeting the expenditure for carrying out various activities/ responsibilities assigned/ to be assigned from time to time to the Third Party under the Charter. Each of the identified Third Parties shall provide the estimated project cost as per the scope of work to participating tanneries willing to join them, who shall also be responsible for ensuring the payment of the services to third party.

(c) UPPCB

UPPCB shall ensure proper implementation of the Charter by the individual tannery unit. They shall be responsible for monitoring and surveillance activities to ensure environmental compliance. Participating tannery units will not be allowed, under any circumstances, for bypassing of PETP/ETP systems and discharge of partially/ untreated effluent or episodic discharge. In case of any violation of the prescribed norms, UPPCB will take appropriate actions, including issuance of closure directions under the Water Act.

Each of the participating tannery shall have option to join either any one of the identified Third Parties or UPPCB for evaluation & validation of their technical reports (self-assessment and planning reports: Preparation of inventory, PETP/ETP Adequacy & upgradation, and Action plans to implement the Charter), and physical verification of their progress reports under the Charter implementation programme.

UPPCBs may constitute Expert Committee(s) for Evaluation & Validation of following reports directly submitted by the participating Mills (if any) to UPPCB

- ✓ PETP/ETP adequacy assessment report, design / drawings and proposed augmentation/ upgradation plan as per Charter
- ✓ Inventory, upgradation requirements and action plan for process upgradation
- ✓ Work plan for reduction in water consumption/ effluent generation

Some of the activities identified for UPPCB are as under:

- To ensure proper implementation of the Charter by the individual tannery and it shall be made a part of consent mechanism.
- Responsible for monitoring and surveillance activities to ensure environmental compliance
- To take appropriate actions under the Water/ Air Acts/ Environment (Protection) Act in case of any serious/ significant violation of prescribed norms
- Participation in evaluation /validation of the status assessment reports, action plan for Charter implementation/ process & PETP/ETP upgradation
- Quarterly review meetings of units, Third Parties & CPCB to facilitate units in timely implementation of the Charter and to assess status of implementation of Charter and environmental compliance by tanneries

- Surveillance Activities
  - ✓ Verification of progress reports
    (on quarterly basis in case directly submitted by participating units, and on random basis in case of submission through Third Party)
  - ✓ Compilation of Implementation Status Report for Submission to CPCB on Quarterly basis
  - ✓ Surprise monitoring

- Facilitation Activities:
  - Technical issues of PETP/ETP upgradation shall by addressed.
  - Common facility for chilled/brine preserved hides may be created by slaughter houses and major suppliers for which facilitation shall be made by UPCB and NMCG.
  - Tannery should promote use of chilled/brine preserved hides and raise demand from local suppliers and slaughter house and for the same they may be facilitated by UPPCB and NMCG

(d) CPCB

CPCB shall supervise and co-ordinate with stake holders namely participating tannery, Third Parties (Associations/ CLRI/Solaridard), Expert Institutions, and UPPCB. CPCB shall periodically review the progress of implementation of the Charter and carry out environmental compliance assessments. Based on findings of the review meetings, CPCB shall take necessary actions namely modification in the Charter/ Action Plan/ roles & responsibilities of participating agencies.

Some of the activities identified for CPCB are as under:

1. Participation in review meetings organised by third parties/ UPPCB.
2. Organising quarterly/ half-yearly review meetings of participating tanneries/ third parties/ UPPCB to review the progress of the Charter implementation programme
3. To supervise, co-ordinate and support to stake holders

4. To take necessary actions namely modification in the Charter/ Action Plan/ roles & responsibilities of participating agencies, interpretation of the provisions prescribed under the Charter, approval for any state of the art technology, etc.

5.1 Conditions Necessary for Timely Implementation of the Charter

1. CPCB shall issue appropriate directions/ guidelines to UPPCB for issuance of directions/ instructions to tannery units operating in the clusters of Banthar, Site-II and Jajmau for implementation the Charter as per the Plan of Activities.
2. UPPCB shall issue appropriate directions/ guidelines to tanneries operating in Banthar, Site-II-Unnao and Jajmau at Kanpur to implement the Charter as per the Plan of Activities.
3. The implementation of the Charter will be considered to be commenced on the date of issuance of directions/ instructions from UPPCB.
4. Participating tanneries may submit Affidavit to UPPCB for implementation of the Charter as per the Plan of Activities and other Terms & Conditions.
5. Tannery Units shall sign MoUs/ Agreements with their selected Third Parties to participate in the programme as per the Plan of Activities and to reimburse the third party expenditure and shall sanction the project as per their mutual agreed ToR.
6. Tannery Associations, which have agreed to implement the Charter as per CPCB/ UPPCB directives/ guidelines, will be allowed to achieve short term, medium term and long term objectives as prescribed by the Charter within the agreed implementation period. Participating Tannery units will not be allowed, under any circumstances, for bypassing of PETP/ETP systems and discharge of partially/ untreated effluent or episodic discharge. In case of any violation on continuous basis or serious/ significant violations, UPPCB will take appropriate actions, including issuance of appropriate directions under the provisions of Water/ Air Acts/ Environment (Protection) Act.
7. No regulatory impediments: Any process modification, construction activity or any other action required to be undertaken by a unit in pursuit of the objectives of this Charter should receive necessary clearances from UPPCB with utmost speed. Concerned authorities should set in place a fast-track, single-window clearance mechanism.
8. Any order/ direction prescribed by any court of law/ tribunal in respect of individual tannery/CETP or in general, shall overrule the provisions/ norms prescribed under this Charter, and shall be complied by the tannery/CETP.
9. UPPCB may prescribe conditions/ norms, etc. stringent than those prescribed under this Charter, and shall be complied by the unit.
10. MOEFCC/CPCB/NMCG/UPPCB may issues directions/ instructions and/ or take up programmes for implementation of advanced technological and managerial tools to achieve further higher technological and compliance status in future for prevention, control and abatement of environmental pollution and to meet the objectives of Clean Ganga Mission.

5.2 Monitoring and Targets

The following are the technical measures, technological interventions and environmental management activities identified for minimization of pollution load with specific focus on Total Dissolved Solids (TDS). The technical measures and interventions are categorized into three viz. (a) short-term measures, which need to be implemented in first 4 months, (b) medium-term measures, that do not demand much of preparation and capital investment and to be implemented from 5th month to 9th month, (c) long-term measure, which are associated with significant preparation and capital investment, and to be implemented from 10th month to 15th month.

Table 1: Pollution Reduction Measures Matrix

S. No.	Category of Technical intervention	Intervention	Parameter to be Addressed	Categories to which applicable
1	Short-term	Mechanical desalting of raw hides	TDS of wastewater of first Soaking	A1, A3
2		Installation of Bar Screens	Reduction in gross solid matter	A1, A2, A3
3		Installation of water meters on drums	Water saving.	A1, A2, A3
4		Installation of Smart Water Saving System	Water saving.	A1, A2, A3
5		Installation of solenoid valves on fleshing machines	Water saving and wastewater reduction.	A1, A3
6		Drum Screeners	Reduction in gross solid matter	A1, A2, A3
7	Medium-term	Processing of green hides	No Cl in soak liquor	A1, A3
8		Processing of Brine cured hides	TDS of wastewater from first Soaking.	A1, A3
9		Pickle-free tanning or waterless chrome tanning	Pickle wastewater TDS of tanning liquor	A1, A3
10		Enzyme based unhairing	BOD of lime liquor Sulphide of lime liquor	A1, A3
11		Upgradation of PETP	TSS of composite wastewater Cr of composite wastewater	A1, A2, A3
12	Long-term	Chilled hides	Cl and TDS	A1, A3
13		Electro Oxidation based zero waste discharge	Wastewater discharge	A1, A2, A3
14		Establishment of common tallow extraction facility	Fleshing utilization	A1, A3
15		Conversion of fleshing waste to biogas	Fleshing utilization	A1, A3

* A1 - Raw to tanning; A2 - Wetblue (tanned leather) to finishing; A3 – Raw to finishing

Table 2: Environmental Targets - Phase 1 (Short-Term)

S. No.	Parameter	Target	Applicable Category
1	Water usage (and wastewater generation)	< 24 L/Kg of rawhide	A3
		< 18 L/Kg of rawhide	A1
		< 6 L/Kg on shaved weight	A2
2	TDS of soak liquor	< 30,000 ppm	A1, A3
3	TDS of composite	< 14,000 ppm	A1
		< 12,000 ppm	A3

Table 3: Environmental Targets - Phase 2 (Medium-Term)

S. No.	Parameter	Target	Applicable Category
1	Water usage (and wastewater generation)	< 21 L/Kg of rawhide	A3
		< 16 L/Kg of rawhide	A1
		< 6 L/Kg on shaved weight	A2
2	TDS of soak liquor	< 30,000 ppm	A1, A3
3	TDS of lime liquor	< 14,000 ppm	A1, A3
4	Sulfide in lime liquor	< 5000 ppm	A1, A3
5	Pickling liquor	No discharge	A1, A3
6	Cr wastewater	No discharge	A1, A3
7	TSS of composite	< 600 ppm	A1, A2, A3
8	Cr in composite	< 10 ppm	A1, A2, A3
9	TDS of composite	< 9000 ppm	A1, A2, A3

Table 4: Environmental Targets - Phase 3 (Long-Term)

S. No.	Parameter	Target	Applicable Category
1	Water usage (and wastewater generation)	< 21 L/Kg of rawhide	A3
		< 16 L/Kg of rawhide	A1
		< 6 L/Kg on shaved weight	A2

2	TDS of soak liquor	< 20,000 ppm	A1, A3
3	TDS of lime liquor	< 9,000 ppm	A1, A3
4	Sulfide in lime liquor	< 5000 ppm	A1, A3
5	Pickling liquor	No discharge	A1, A3
6	Cr wastewater	No discharge	A1, A3
7	TSS of pretreated wastewater	< 600 ppm	A1, A2, A3
8	Cr in composite	< 10 ppm	A1, A2, A3
9	TDS of composite	< 5500 ppm	A1, A2, A3
10	Fleshing waste	Not disposed	A1. A3
11	Zero discharge	No discharge	For select tanneries

Besides the monitorable targets, the following necessary action points/targets shall also be implemented by individual tannery:

i. Process water abstraction shall be done from a single bore-well source. However, a stand-by bore-well may be permitted for emergency purposes. Both the bore-wells shall have separate electro-magnetic flow meters and log books shall be maintained. Units can also connect electro-magnetic flow with CPCB server.

ii. Independent/segregated used chrome conveyance system comprising of closed pipeline with appropriate covered facility for storage of recovered chrome and exhaust chrome liquor shall be ensured by the units.

iii. Every individual tannery/CETP shall have only single effluent discharge point having electro-magnetic flow meter and log book shall be maintained.

iv. Log Book for basic raw material i.e. hides/skins and chemicals consumed in the process shall be maintained.

v. Equalization tank retention time shall be minimum 24 hours. The chemical dosing shall be done in sequence & separately for Lime and Alum, with proper mixing arrangement and not in the same tank. The clarifier system of the PETP shall have minimum retention time of 4 to 5 hrs.

vi. Primary Settling tank shall have SOR of 1m3/m2/hr (maximum), Retention time 4-5 hours and Flow rate regulated in accordance with the SOR. The primary settling tank may be rectangular in shape.

vii. Tube settler or Lamella settler may be installed to increase retention time in PETP.

viii. Mechanical sludge de-watering system such as Filter Press shall be installed for speeding-up the drying process and quick disposal of the solid waste.

ix. The daily reading of the electromagnetic flow meter at discharge point of member units be collected by the CETP and thereafter a consolidated monthly data be sent to the CPCB by 10th of every month.

x. Monthly returns of Hazardous waste disposal made to the secure land fill facility be provided to the CPCB by the individual unit by 10th of every month.

xi. Quarterly cleaning of CETP conveyance system.

xii. Adequacy report of PETP & CRU to be obtained by individual Units from technical institutes like CLRI, IITs, etc. / third party engaged by individual tannery and necessary improvement to be implemented as per time line.

xiii. Self-certified infrastructure details installed at their premises, in respect of number, type and size of drums/Paddles/Pits, production capacity, operating time and number of hides can be processed to confirm that infrastructure installed is in accordance to the licensed/ installed capacity. The member units shall engage Technical institutes or Third Party for obtaining capacity assessment report s and submit the report to UPPCB along with Action Plan.

xiv. Basic testing facility for PETP effluent quality norms be created at the CETP, which will be availed by the member units of the CETP. Daily analysis of PETP quality by carried out & log book be maintained.

xv. The operation & maintenance of PETP & CRU shall be carried out by trained personnel. There shall be a list showing the names & educational qualification of the operator & workmen. The training of the operators may be carried out under some expert in this field.

xvi. Constitution of an Environment Management Cell (EMC) for all the three tannery clusters. The EMC shall conduct fortnightly meetings to discuss on the environmental issues. The EMC shall also constitute at least 2 outsiders (2 from Technical institutes) members and 1 member from Uttar Pradesh Pollution Control Board, besides other members.